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## CLASSIFICATION OF TYPICAL IRREGULARITIES OF THE MAXILLÆ AND TEETH.

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THE literature of the etiology of irregularities of the maxillæ and the teeth is meagre, showing that its study has been limited. Scientific investigation in this department has been neglected for reasons that are obvious. In the first place, to come to correct generalizations it is necessary to make extensive observations. Generalizations based on the observation of a few facts are of little value. Few practitioners enjoy opportunities for studying many cases, as the correction of irregularities forms the exception in general practice. To arrive at correct conclusions as to the causes of deviations from the normal it is necessary to take impressions and preserve casts for study, to visit asylums and schools of defective individuals such as the insane, deaf and dumb, blind, and idiots, and to compare such observations with those made of normal mouths. Before the student can crystallize his observations into theories, his studies should extend over a number of years, include a large number of cases, and a comparison of his conclusions with those of others, carefully weighing their objections and arguments.

It will thus be seen that the average practitioner has neither time nor opportunities for such researches, and that only a genuine love for the subject will urge to the toil and patience necessary to accomplish much in this field. A number of cases that came under my observation over ten years ago led me to read all the literature then extant, which was found to be limited chiefly to the correction of irregularities, the causes not having been touched upon to any extent. The asylum for feeble-minded children at Media, Pa., offered an excellent field for study. Irregularities were numerous here. It was natural to ask, Why should irregularities of the jaws and teeth accompany idiocy? A neurotic condition and arrested brain-centers are invariably found in these cases. These produce

excessive development or arrest of development of the skeleton and soft tissues of the body. Why should not the maxillæ and teeth be affected in the same way and asymmetry be produced? The teeth were not found of abnormal size and proportions, but the relative development of maxillæ and teeth was found to be unequal. Observations extending over a number of years in the different asylums of Illinois among the insane, deaf and dumb, and idiotic strengthened this view. Impressions taken during the past eight years, amounting to over eight hundred, together with the large collections of Dr. Farrar, of New York, and Dr. Shepard, of Boston, over two thousand in all, furnished abundant matter for study and comparison. Observation was also made of irregularities of the teeth in individual cases, in a number of which impressions of the mouth were taken every three months and the models compared to note the changes. It was found that in some complex forms of irregularities the teeth subsequently arranged themselves into the simpler forms mentioned hereafter.

As the study of irregularities is a comparatively recent one, the attempts at classification have been necessarily elementary, and the causes that produced variations from the normal have been scarcely touched upon. Particular pains have been taken in these investigations to study into the causes that produced them. It is intended to show in this paper, but more fully in a work now in preparation, that every case of irregularity is traceable to one or more causes, in conformity with the laws that govern the physiological and pathological processes of the rest of the body. There is a constant relation between dentistry and other departments of medicine which needs to be emphasized in this connection,—not relative to mechanical substitutes and appliances, but including physiological, pathological, and therapeutical problems. The laws governing the health and disease of the mouth do not differ from those appertaining to the rest of the body. The correctness or incorrectness of a theory advanced with regard to abnormal conditions may be determined by the application of this test.

All irregularities of the maxillæ and teeth may be traced to the following causes:

I. *Constitutional*: mal-proportion and mal-relation of the maxillæ due to excessive or arrested development.

II. *Local or circumstantial*:

- (1) Improper occlusion;
- (2) Want of accord between waste and repair;
- (3) Neglect of function.

These causes are deviations from the general laws that govern the healthy relation and function of the teeth:



I. A proper relative size of the organs of mastication;

II. A proper occlusion of the teeth;

III. Accord between the processes of waste and repair;

IV. Proper functional activity.

These form the basis of the classification adopted.

In correcting irregularities it is necessary to determine the cause in each case; only in this way can they be successfully dealt with. In this paper an attempt is made to classify irregularities according to their underlying cause, and to explain as concisely as possible the similarities and differences upon which the classification is based.

Such a system of classification not only helps us to get a clearer view of each variety, its cause and best method of correction, but the study of deviations from the normal helps us to a more correct view of the normal jaw. The monstrosities of nature often give a clue to her laws. The study of irregularities has therefore a bearing not only on dentistry, but on anatomy, physiology, related pathological conditions, and also on some questions of sociology.

In order that aberrations from the normal may be better understood, let us first consider the question, what constitutes a normal arch.

There are three characteristics of the normal arch. Independent of temperamental peculiarities, the line extending from one cuspid to the other should be an arc of a circle, not an angle or straight line; the lines from the cuspids to the third molar should be straight, curving neither in nor out, the sides not approximating parallel lines. Absolute bilateral uniformity is not implied in this, as the two sides of the human jaw are rarely if ever wholly alike. A uniform arch necessitates a uniformity of development between the arch of the maxilla and the arch of the teeth, and a correct position of the individual teeth in their relation to each other. When there is inharmony of development between the jaw and the teeth, as may happen when one parent has a small maxilla with correspondingly small teeth, and the other a large one with correspondingly large teeth, if the child inherits the jaw of one and the teeth of the other, irregularities must follow. Such difference in diameter between the arch of the maxilla and that of the crowns of the teeth is a constitutional cause of irregularity.

Whenever there is a difference between these diameters, the line formed by the teeth must either fall outside or within the arch of the maxilla, and irregularities of arrangement result. A local cause is established by a forward movement of the first molar due to premature or tardy extraction of deciduous teeth, or the arrested growth of the ramus or of the lower maxilla. It will be seen by examining each type of irregularity that constitutional causes are

not alone responsible, local causes almost invariably co-operating. Hence it appears that there is no propriety in speaking of inherited irregularities of the teeth *per se*. Constitutional and local causes combine to produce the result,—i.e., a maxilla smaller than the diameter of the teeth. A high arch is not the result of irregularity, as has been supposed. This inference might be drawn from the fact that in both of the primary forms of irregularity, the V-shaped and saddle-shaped, the lateral diameter of the arch is contracted. But the high vault is a peculiarity of the nervous temperament, and is found independent of irregularities. If irregularities and high vaults were always concomitants, this inference would appear tenable; but it is more reasonable to suppose that overlapping of incisors to some extent results from a contracted vault than that the contracted vault results from the overlapping. The character of the dome is determined before that of the teeth, for when the permanent

FIG. 1.

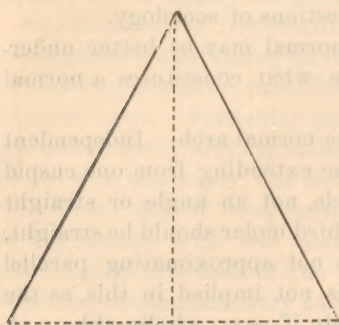
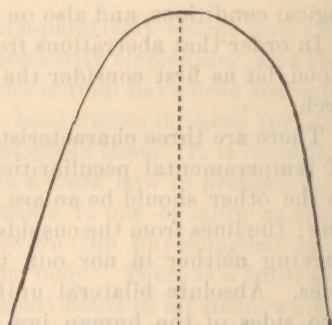


FIG. 2.



teeth make their appearance the dome is pretty well developed. It is therefore reasonable to conclude that a high and comparatively narrow roof are the peculiarities of a type, just as high cheek-bones and a massive jaw are.

The primary divisions of irregularities are the V-shaped and saddle-shaped arches. We have the V-shaped variety (Fig. 1),\* where the apex of a triangle is formed by two incisors, the base of the triangle being a line connecting the two first molars. If because of premature or tardy extraction the first molar moves forward, or the coincidence of the arch of the maxilla and the arch of the crowns of the teeth is disturbed, the arch formed by the crowns of the teeth in trying to accommodate itself to the lesser arch of the maxilla becomes a broken line forming an angle at the incisors.

\* While the general outlines of the jaws and teeth are the same, in no two cases are they exactly alike. The cuts therefore are not drawn from actual cases, but are ideal diagrams of typical cases.



This angle results from two causes,—the thinness of the process at this point and the diminution of resistance which must follow.

Modification of the V-shaped arch results from modifications of the above-named conditions. A difference in the time of eruption of the cuspids, everything else being equal, effects a difference in the space left for their accommodation, and thus partial V-shaped arches are found. The key-stone, the cuspid, is not entirely outside or inside of the arch in the partial V-shaped form, but may appear partially crowded out of place. Hence the arch is neither a normal curve nor wholly angular, but unites the characteristics of both. Its lateral diameter is less than that of the normal arch, giving it a contracted appearance. (See Fig. 2.) Thus a number of varieties of the fundamental forms of the V-shaped arch are formed, differing in degrees of anterior contraction. All of these result from the comparative thinness of the anterior portion of the process offering

FIG. 3.

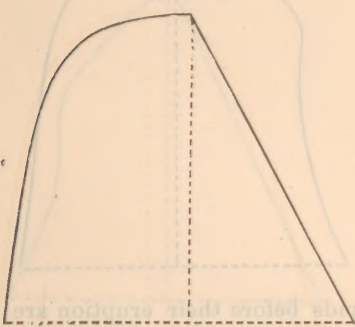


FIG. 4.



but little resistance, an abnormal pressure from behind, and the greater strength of the cuspids, which causes them to seek room irrespective of the space left for them. When one side of the process near the symphysis is the stronger, thus affording greater resistance, or the pressure from the cuspid is less, that side may maintain its normal relations while the other may give way to conditions resulting in a V-shaped contraction. The curve will then be broken, not at the apex of the triangle, but near it; the incisors will overlap, and when pressure from the cuspid acts on the weaker column it must give way. This results in the semi-V-shaped form. (Fig. 3.)

When the permanent bicuspid erupt under favorable conditions, so that their greatest diameter is in a line with the greatest diameter of both cuspid and first molar, they will be held firmly in place, since the greatest pressure is on this very line. On the other hand, when the bicuspid are erupted *after* their proper time while the cuspids progress duly, the cuspids meeting with no resistance fall into

their proper places, but the bicusps adapt themselves as best they can to the space left for them, and if the arch of the maxilla does not coincide with that of the crowns, they must fall within or without the arch. Now if the first molar has moved forward, diminishing the space, the bicusps must erupt either within or without the arch.

To understand why they are generally found within the arch, the shapes of the molar and cuspid must be kept in mind. A transverse section of their crowns shows their proximal walls not to be parallel but wedge-shaped, their diameter being greater on the buccal than on the palatal side. When the crowded bicusps fall within the greatest diameter of these teeth, finding more room within the arch, they naturally slip in the direction of least resistance,—i.e., toward the palate. A local cause for the same condition is found in

FIG. 5.

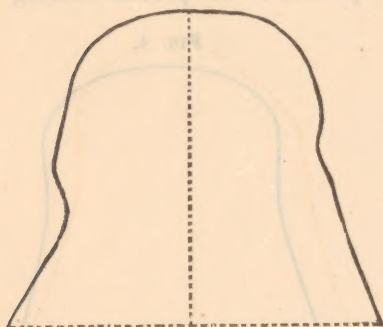
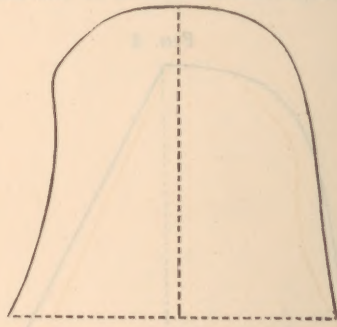


FIG. 6.



the fact that the crowns of the bicusps before their eruption are imbedded in the roots of the temporary molars, and as these form an arc of a smaller circle than that of the permanent teeth, the bicusps will be found generally inside the arch. From both causes we have an inward curvature, which we term the saddle-shaped arch. (Fig. 4.) It should be noted here that while the V-shaped irregularity is found anterior to the cuspid, the upper incisors always projecting beyond the lower, the saddle-shaped irregularity is invariably posterior to the cuspid, and the bicusps form an inward curve. The incisors never project. Both forms contract the arch, the V-shaped anteriorly, the saddle-shaped posteriorly. In both forms the forward movement of the first molar is the local cause. When the unfavorable conditions that result in the saddle-shaped arch are not so pronounced, we have the partial saddle-shaped arch. Thus because of the greater uniformity of the maxilla and of the arch of the crowns there may be more space, and the bicusps may be forced but little out of place, or the molar may move forward but slightly, interfering less with the bicusps.



Sometimes it happens that in trying to adjust themselves to the limited space one bicuspid may be crowded outward and another inward. Sometimes the first bicuspid is in, more frequently the second. (Fig. 5.) As has been stated before, this could not take place if the greatest diameter of cuspid, bicuspid, and molar were in the same line, but the diameter of one of the bicuspids may be in a line with that of the adjoining tooth while that of the other is not, and then one is pressed along the line of the least resistance. As in the case of the V-shaped arch, one side of the mouth may be normal because of the absence of any local condition interfering with the space. One temporary molar may have been extracted, allowing the permanent one to move forward while the other remains in place. The result which follows is an asymmetry of lateral halves termed semi-saddle-shaped irregularity. (See Fig. 6.)

FIG. 7.

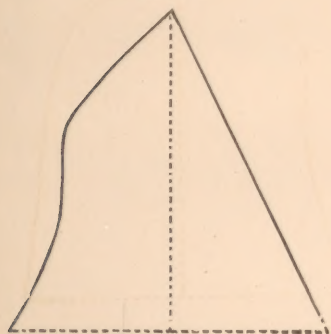
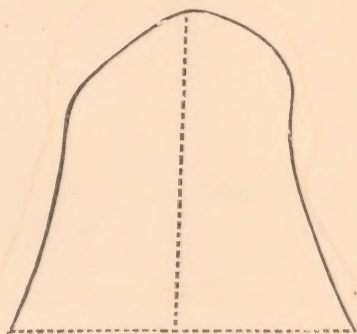


FIG. 8.



How the V-shaped and saddle-shaped arch on one side only may be produced has already been described. How they may be combined on one side remains to be explained. Given thinness of process in the anterior part of the mouth, premature or tardy extraction of the cuspid, and there will be a forward movement of the incisors. The development of the cuspid will press the alveolar process inward, thereby contracting the arch, and the tardily erupted bicuspids will adjust themselves to the limited curve as before stated. In this way the features of the two forms are combined; that is, a contracted or angular anterior arch, and a posterior arch that is more or less concave. The opposite side may be V-shaped, saddle-shaped, or normal. (Figs. 7 and 8.)

The large collection of models illustrating these different forms of irregularities of the jaws and teeth which was on exhibition at the meeting of the American Dental Association, has been placed in the Army Medical Museum at Washington, and may be examined at any time by those interested in this work.

sometimes it happens that in trying to adjust themselves to the limited space one jawbone may be crowded outward and another inward. Sometimes the first displaced is in more frequently the second. (Fig. 5.) It has been stated before this could not take place if the greatest diameter of erupted incisors and molars were in the same line, but the diameter of one of the incisors may be a line with that of the adjoining tooth while that of the other is not and then one is pressed along the line of the least resistance. As in the case of the V-shaped arch one side of the mouth may be normal because of the absence of any local condition interfering with the space. One temporary factor may have been extracted, allowing the permanent one to move forward while the other remains in place. The result which follows is an asymmetry of lateral halves termed *scissel-shaped irregularity*. (See Fig. 6.)



How the V-shaped and scissel-shaped arch on one side only may be produced has already been described. How they may be combined on one side remains to be explained. Given a case of protrusion in the anterior part of the mouth prominent or laterally extruded one of the incisors and there will be a forward movement of the line of the cusps and there will be a forward movement of the incisors. The development of the cusps will press the adjacent process forward, thereby contracting the arch, and the resulting erupted incisors will adjust themselves to the limited space as before stated. In this way the nature of the two forms are combined; that is, a contracted or angular anterior arch, and a protruded arch that is more or less contracted. The opposite side may be V-shaped, scissel-shaped, or normal. (Fig. 7 and 8.)

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